

that in the present experiment there was a loss of between three and four inches of nitrogen to be sought in the residuum which had been heated in the metallic tube. But when the tube was opened, nothing was found but potash that had been fused, and a small quantity of potassium sublimed into its upper part; so that in the place of the nitrogen nothing was found but oxygen contained in the potash, which, together with a small excess of hydrogen, may amount to the weight of the nitrogen lost.

In other experiments five grains of the olive-coloured ammoniacal pyrophorus, formed by potassium, yielded by mere heat, or by oxygen, three fourths of an inch of nitrogen; but by water they evolved one fifth of hydrogen, and $3\frac{1}{4}$ of ammonia, which by estimate contain $1\frac{1}{2}$ of nitrogen.

If the nitrogen is to be considered as converted into oxygen and hydrogen, it must be regarded as containing much more oxygen than water; and if we do not adopt this supposition, Mr. Davy considers the only alternative to be, that water is the ponderable matter which, under different modifications of electro-chemical existence, constitutes oxygen, hydrogen, nitrogen, and the nitrous compounds; but with respect to conclusions so important, and so little to be expected by any analytical chemist, it appears to Mr. Davy highly unphilosophical to decide in the present state of our knowledge.

The Croonian Lecture. By William Hyde Wollaston, M.D. Sec. R.S.
Read November 16, 1809. [*Phil. Trans.* 1810, p. 1.]

Since the remarks, which the author has connected together on the present occasion, as tending, each of them, to promote the design of Dr. Croone, do not appear to bear any direct relation to each other, he divides the lecture into three distinct heads; the first of which contains an observation, and some experiments on the duration of muscular action. In the second he traces the origin of sea-sickness, from a mechanical cause deranging the circulation of the blood. In the third he offers a mechanical explanation of the advantages derived from riding, and the various modes of carriage exercise.

With regard to the duration of muscular action, the author is of opinion that each effort, apparently single, consists in reality of a great number of contractions, repeated at extremely short intervals. He infers the existence of these alternate motions, from a sound observed upon inserting the extremity of the finger into the ear. The sound resembles that of carriages at some distance passing rapidly over a pavement. The sound is not perceived when the force applied to stop the ear is not muscular, unless the action of some distant muscle be communicated through some medium capable of conveying its vibrations.

With a view to estimate the frequency of these vibrations, the author contrived to imitate them by rubbing a stick, regularly notched, and placing it in such a position, that the tremor was communicated to the ear along with the muscular vibrations. The results of such

trials was, that the vibratory alternations recur between twenty and thirty times in a second, but varying in number in proportion to the degree of force exerted by the muscle.

The utmost frequency which he has observed, he estimated at 35, and the lowest 15. But he considers the visible unsteadiness of an aged or infirm person, to arise from a less frequent repetition of the same motions.

In the second part of this lecture, which treats of sea-sickness, the author described an irregularity that he observed in his respiration, after having suffered some days from that affection, which appeared to be an involuntary effort of the constitution to relieve itself, by counteracting the effects of the motion of the ship.

In waking from a disturbed sleep, he remarked that each effort of inspiration was suspended for a time, and was then taken with a certain feeling of adaptation to some unknown motion of the sea. In reflecting afterwards upon this observation, it appeared to him that the act of inspiration might afford relief by means of its effect upon the circulation. For since, when the skull is trepanned, the effect of inspiration in withdrawing blood from the brain is manifested by the alternate heaving and subsidence of the brain, in alternate motion with the opposite states of the chest, the act of inspiration must tend to counteract any cause propelling blood to the head. And such a cause of pressure will manifestly occur in the descent of a ship by the subsidence of a wave on which it rests. When a person is standing erect upon deck, the motions of the column of blood contained in his vessels may be compared to those of quicksilver in a barometer. When the deck descends, the fluids no longer press with their whole weight against the force which supported them. The mercury continuing to be pressed with the whole weight of the atmosphere is seen to rise in the tube containing it, and so also the blood continuing to be pressed with the same elasticity of the vessels, which before supported its whole weight, is now driven upwards by the excess of force, and the most distressing sensation of sickness is then felt in consequence of its pressure upon the brain. But if an effort of inspiration be exerted at the same instant, it cannot but lessen this propensity, and have some effect in relieving the consequences.

An opposite effect is also noticed by the author to arise from motion in an opposite direction. For when a person rises very suddenly from an inclined position, and is at the same time, by previous fatigue, more than usually sensible of the consequences, he perceives a temporary sensation of faintness and giddiness, by partial abstraction of blood from the vessels of the brain; and may immediately relieve these symptoms by descending again suddenly to his former posture.

The explanation contained in the third part of the lecture, of the salutary effects of external or passive motion, is founded upon one necessary consequence which, he observes, must take place from mere mechanical agitation. Since the direction in which the circulation of the blood is carried forward in animal bodies, is given solely by the position of the valves that are to be found in the circulating

system, so also will a similar direction be given to the effects of external motion. Every motion tending to propel forward the blood, will hence assist the powers of the heart; but such as have a contrary tendency will be resisted by the interposition of the valves, and cannot occasion proportional obstruction to the regular progress of the blood; the heart is thus assisted in the work of restoring a system, which has recently struggled with some violent attack, or allowed, as it were, to rest from a labour to which it is no longer equal, when the powers of life are nearly exhausted by some lingering disorder.

It is conceived that all the other animal functions must participate in the relief thus afforded to so important an organ; and it is remarked, that even the powers of the mind itself, though most remote from our conception of material agents, are, in many persons, thus immediately affected, by the consequences of a merely mechanical operation.

The Bakerian Lecture for 1809. On some new Electrochemical Researches, on various Objects, particularly the metallic Bodies, from the Alkalies, and Earths, and on some Combinations of Hydrogen. By Humphry Davy, Esq., Sec. R.S. F.R.S.E. M.R.I.A. Read November 16, 1809. [Phil. Trans. 1810, p. 16.]

Mr. Davy having from the commencement of his electro-chemical researches, communicated the several steps of his progress to the Society, takes the present opportunity of reporting the results of his further inquiries under four principal heads. First, on the nature of the metals of the fixed alkalies. Second, on the nature of hydrogen and composition of ammonia. Thirdly, on the metals of the earths; and, Fourthly, he makes a comparison between the antiphlogistic doctrine, and a modified phlogistic hypothesis.

When Mr. Davy first communicated to us his discoveries of potassium and sodium, he adopted, as most probable, the antiphlogistic interpretation of the phenomena, and considered potassium and sodium as simple metallic bodies, of which potash and soda are the oxides. The same experiments have since been repeated by others with the same results, but the explanations given by different chemists have been various. The theory which has appeared most deserving the author's notice, and is more particularly controverted, is that of Messrs. Gay-Lussac and Thenard, who conceive these metals to be compounds of their respective alkalies with hydrogen; although in the interpretation of their own production of a metallic substance from boracic acid, they relapse again into the antiphlogistic doctrine, and suppose themselves to have effected a decomposition, by abstraction of oxygen from it.

Since the principal experiment on which Messrs. Gay-Lussac and Thenard rely, is that in which ammonia is acted upon by potash, Mr. Davy details a great number of modes in which he has varied the experiment with the utmost care to avoid moisture, which appears to